a loudspeaker acoustically coupled to the fixed-volume chamber;

a reference microphone acoustically coupled to the fixed-volume chamber, the reference microphone producing a first pressure signal; and

a sensing microphone acoustically coupled to the measurement chamber via a second port, the second port comprising a tube portion, and the sensing microphone producing a second pressure signal based on the response of the measurement chamber to excitement by the loudspeaker;

a dispensing chamber containing a variable fluid volume and a resilient membrane, the dispensing chamber attached to the structure, the resilient membrane defining boundary between the dispensing chamber and measurement chamber; and

a processor in communication with the loudspeaker, the reference microphone and the sensing microphone, the processor receiving the first pressure signal and the second pressure signal at a first instance, correcting the second pressure signal based on the first pressure signal at the first instance, receiving the first pressure signal and the second pressure signal at a second instance, and determining a volume of fluid dispensed from the dispensing chamber based on the second pressure signal at the second instance relative to the first instance.

15. The apparatus for determining the volume of fluid dispensed according to claim **14** wherein the sensing microphone and loudspeaker are configured to prevent loudspeaker pressure waves from impacting the sensing microphone without passing through the measurement chamber.

16. The apparatus for determining the volume of fluid dispensed according to claim **14** further comprising a flared aperture adjoined to least one of the first and second ports, wherein the flared aperture is attached to the measurement chamber.

17. The apparatus for determining the volume of fluid dispensed according to claim **14** further comprising a dispensing spring, wherein the dispensing spring provides additional resilience to the resilient membrane.

18. The apparatus for determining the volume of fluid dispensed according to claim **17** wherein the dispensing spring is part of the acoustic volume sensor.

19. The apparatus for determining the volume of fluid dispensed according to claim **14** further comprising a reservoir, valve, and a fluid line wherein the fluid line fluidicly connects the reservoir to the valve and fluidicly connects the valve to the dispensing chamber.

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